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1 1. A method for use in a distributed system for  
2 processing a knowbot program that has the ability to move  
3 from node to node in the distributed system comprising  
4 in an operating environment in each of the nodes,  
5 providing service facilities useful to the knowbot program,  
6 and  
7 in the operating environment running a supervisor  
8 process that enables the knowbot program to make use of the  
9 service facilities but does not permit direct access by the  
10 knowbot program to facilities of the operating environment.

1 2. The method of claim 1 further comprising creating a  
2 bastion object in the unrestricted environment to protect  
3 the unrestricted environment and passing it into a  
4 restricted environment within which the knowbot program is  
5 running.

1 3. The method of claim 2 in which the bastion object  
2 provides an interface for the knowbot program to access the  
3 service facilities in a safe manner and which is  
4 substantially the same interface as the interface that the  
5 service facilities provide in the unrestricted environment.

1 4. The method of claim 2 in which the bastion object  
2 performs type checking on all method calls made by a knowbot  
3 program to a service facility.

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1        5. A method for use in a distributed system for  
2 processing a knowbot program that executes in one node of  
3 the distributed system, may be interrupted at almost any  
4 point in its execution, and may be moved to another node of  
5 the distributed system for further execution, comprising  
6        in the one node, capturing a current state of the  
7 knowbot program execution,  
8        delivering the captured state and program code of the  
9 knowbot program to the other node, and  
10       continuing execution at the other node from the point  
11 of interruption based on the captured state and the program  
12 code.

1        6. The method of claim 5 further comprising  
2        also delivering with the captured state and the program  
3 code a transported file system or other information created  
4 during execution of the knowbot program.

1        7. The method of claim 6 in which the information in  
2 the transported file system or other information is  
3 accessible without executing the knowbot program.

1        8. The method of claim 5 in which the step of  
2 capturing comprises using an encoding scheme of a language  
3 interpreter.

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1        9. A method for enabling communication with a knowbot  
2 program running in a distributed system, a knowbot service  
3 station, an extension, or another application, comprising  
4        providing a connector mechanism which permits each of  
5 the knowbot programs, knowbot service stations, extensions,  
6 and other applications to identify services that it  
7 provides, and permits each of them to find services that it  
8 needs, and  
9        enabling knowbot programs to communicate with knowbot  
10 service stations via connector objects associated with the  
11 connector mechanism.

1        10. The method of claim 9 in which the connector  
2 object is provided by a supervisor process running in the  
3 distributed environment and the connector object prevents  
4 uncontrolled access to a needed service.

1        11. The method of claim 9 in which the connector  
2 mechanism includes a connector broker and connector manager.

1        12. The method of claim 9 in which the connector  
2 objects are data typed.

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1        13. A method for enabling negotiation between two  
2 unrelated knowbot programs, knowbot service stations,  
3 extensions, or other applications, in a distributed system,  
4 comprising

5        in an operating environment in a node of the  
6 distributed system, receiving information from one of the  
7 two knowbot programs, knowbot service stations, extensions,  
8 or other applications, concerning a transaction offered to  
9 other knowbot programs, knowbot service stations,  
10 extensions, or other applications,

11        in the operating environment in the node, receiving  
12 information from the other of the two knowbot programs,  
13 knowbot service stations, extensions, or other applications  
14 concerning a transaction in which the other of the knowbot  
15 programs, knowbot service stations, extensions, and other  
16 applications wishes to engage,

17        notifying the other knowbot program, knowbot service  
18 station, extension, or other application of the one knowbot  
19 program, knowbot service station, extension, or other  
20 application, and

21        enabling the two knowbot programs, knowbot services  
22 stations, extensions, or other applications to communicate  
23 concerning the transaction.

1        14. The method of claim 13 in which the information is  
2 received from the two knowbot programs by a third knowbot  
3 program.

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1        15. A method for enabling action by an operating  
2 environment in a distributed system with respect a knowbot  
3 program which is programmed in a language that is not fully  
4 supported by the operating environment, comprising  
5        labeling a knowbot program to identify operating  
6 environment features required for full support of the  
7 knowbot program,  
8        in an operating environment, examining the labeling of  
9 the knowbot program to determine whether the operating  
10 environment supports all of the identified features, and  
11        taking an action based on whether all the identified  
12 features are supported.

1        16. The method of claim 15 wherein the action  
2 comprises sending the knowbot program to another operating  
3 environment for processing.

1        17. The method of claim 15 in which the action  
2 comprises retrieving non-program specific data from the  
3 knowbot program.

1        18. A method for aiding communication with a knowbot  
2 program executing in operating environments provided at  
3 nodes of the distributed system, comprising  
4        maintaining a name space that uniquely identifies types  
5 of information to be interchanged, and  
6        using a name within the name space to identify the type  
7 of information to be interchanged.

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1        19. The method of claim 18 in which the knowbot  
2 program registers an interface which includes the name of a  
3 type of information that is to be interchanged.

1        20. A method for controlling the timing of execution  
2 of an action associated with a knowbot program running in an  
3 operating environment provided at a node of a distributed  
4 system, comprising  
5        providing a trigger protocol in the operating  
6 environment,  
7        enabling the knowbot program to register a condition  
8 with the operating environment,  
9        causing the operating environment to trigger the  
10 execution of the action upon the occurrence of the  
11 condition.

1        21. The method of claim 20 in which the trigger  
2 protocol defines trigger statements each of which identifies  
3 at least the condition and the action.

1        22. The method of claim 20 in which the operating  
2 environment maintains a table of registered trigger  
3 expressions for all knowbot programs that have registered  
4 conditions.

1        23. The method of claim 20 in which the execution is  
2 triggered by a program contained in the knowbot program.

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1 24. A method for controlling interaction between a  
2 knowbot program and an application running in an operating  
3 environment provided at a node of a distributed system,  
4 comprising  
5 defining a trusted portion of the operating environment  
6 which provides trusted services to the knowbot program,  
7 requiring portions of the application running in the  
8 operating environment to be registered as trusted, and  
9 permitting indirect interaction via the operating  
10 environment between the knowbot program and the application  
11 running in the operating environment only if the portions of  
12 the application required to be registered have been  
13 registered.

1 25. A method for enabling a knowbot program to carry  
2 out defined functions including otherwise unsafe functions,  
3 thorough the use of extensions comprising  
4 coding safe extensions to an operating environment and  
5 to the interpretive language under which the knowbot program  
6 runs, and  
7 permitting the knowbot program to carry out the defined  
8 functions by making use of the extensions.

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